

# NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



## THESIS

### SURVIVABILITY OF FREE INFORMATION RESOURCES ON THE WEB

by

Charles A. Romano

September 1996

Co- Advisors:

William J. Haga  
David R. Henderson

Approved for public release; distribution is unlimited.

19970121 212

DTIC QUALITY INSPECTED 1

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE September 1996	3. REPORT TYPE AND DATES COVERED Master's Thesis		
4. TITLE AND SUBTITLE <b>SURVIVABILITY OF FREE INFORMATION RESOURCES ON THE WEB</b>		5. FUNDING NUMBERS		
6. AUTHOR(S) Romano, Charles A.				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey CA 93943-5000		8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12b. DISTRIBUTION CODE		
13. ABSTRACT (maximum 200 words)  Economists rightly believe that people rarely give away valuable resources. Yet a casual look at the World Wide Web suggests otherwise. This thesis shows that the economists are right: firms and organizations, even on the World Wide Web, rarely give away valuable information. Instead, the Web sites are "advertising sites." Just as "free TV" is based on paid advertising, apparently free access to Web sites is really access to advertising. This conclusion is based on a statistical analysis of 58 Web sites. The sites were chosen using the snowball relational sampling technique, whereby one Web site leads logically to others. Five percent of the sampled sites were closed during the period of the study. Hypothesis testing using the variables category, product, motive, revenue base, charges, and documentation permit the conclusion that the remaining 95 percent are likely to be maintained by their hosts and sponsors. This is comforting news for DoD users of informational services on the Web. DoD users are likely to have access to such services in the future.				
14. SUBJECT TERMS World Wide Web, Internet, Commerce, Economics of Information		15. NUMBER OF PAGES 46		
		16. PRICE CODE		
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	



Approved for public release; distribution is unlimited.

**SURVIVABILITY OF FREE INFORMATION  
RESOURCES ON THE WEB**

Charles A. Romano  
Lieutenant Commander, United States Navy  
B.S., University of Lowell, 1984

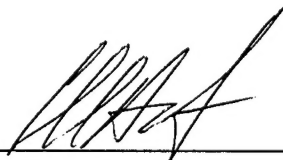
Submitted in partial fulfillment  
of the requirements for the degree of

**MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT**

from the

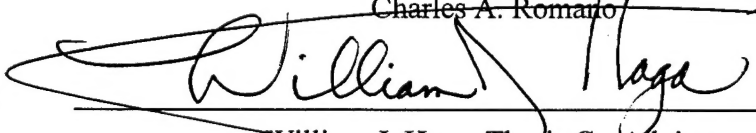
**NAVAL POSTGRADUATE SCHOOL  
September 1996**

Author:



Charles A. Romano

Approved by:



William J. Haga, Thesis Co-Advisor



David R. Henderson, Thesis Co-Advisor



Reuben T. Harris, Chairman  
Department of Systems Management



## ABSTRACT

Economists rightly believe that people rarely give away valuable resources. Yet a casual look at the World Wide Web suggests otherwise. This thesis shows that the economists are right: firms and organizations, even on the World Wide Web, rarely give away valuable information. Instead, the Web sites are "advertising sites." Just as "free TV" is based on paid advertising, apparently free access to Web sites is really access to advertising. This conclusion is based on a statistical analysis of 58 Web sites. The sites were chosen using the snowball relational sampling technique, whereby one Web site leads logically to others. Five percent of the sampled sites were closed during the period of the study. Hypothesis testing using the variables category, product, motive, revenue base, charges, and documentation permit the conclusion that the remaining 95 percent are likely to be maintained by their hosts and sponsors. This is comforting news for DoD users of informational services on the Web. DoD users are likely to have access to such services in the future.



## TABLE OF CONTENTS

I.	INTRODUCTION .....	1
II.	METHODS .....	3
III.	FINDINGS .....	11
	A. DESCRIPTION .....	11
	B. ANALYSIS .....	15
IV.	DISCUSSION .....	25
V.	CONCLUSION .....	29
APPENDIX.	CODED DATABASE OF SITES, INCLUDED IN THIS STUDY .....	31
	LIST OF REFERENCES .....	35
	INITIAL DISTRIBUTION LIST .....	37





## I. INTRODUCTION

In January 1995, most people believed that the Internet, including the World Wide Web, was essentially barren as a source of valuable information. The common impression then was that the main purpose of the Internet was to distribute computer technology and pornography. I revisited the Internet and the Web specifically in December of 1995. My earlier impression was shattered. In the space of 12 months, the Web, as a source of valuable information, had gone from what I impressionistically scored as nearly zero to a figurative cornucopia. Many information-dispensing sites on the World Wide Web make their content and services available at a price of zero. While many people enjoy and exploit this situation, this researcher was dogged by a nagging concern that the people and organizations that hosted and sponsored these sites would not survive if they gave their products away. How could these sites keep going if they were giving away the goods?

This researcher answered the question by surfing the Web using a snowball sampling method to gather data. The sampling method provided a frame of fifty-eight sites from which to gain insight. The question was broken into the following subquestions.

1. What type of product or service is the site electronically marketing or providing on the Web?
2. What organizational affiliation does the site have?
3. How are users charged, if they are charged at all, for the products or services offered by an organization?
4. If the site offers valuable information at zero price, how does the site derive its fiscal nourishment?
5. Why has the site been constructed and maintained?

These dimensions were transformed into variables for analysis. SPSS was used to produce both descriptive and analytic statistics. The multi by multi dimension of the cross tabulation led the researcher to use Cramer's V to test for the strength of the relationship between variables. These statistical results allowed the researcher to reach definitive findings. These findings led to a series of partial answers, which were then assimilated to give definitive insight to the overall question.

## II. METHODS

This is an examination of why various firms and organizations provide valuable information on Web sites at a price of zero. No sample frame exists from which to draw a representative sample. Therefore we turned to a snow ball relational sampling technique (Emory and Cooper, 1995; Denzin, 1989), where one site visit leads to others; through associated links or subject matter.

We began with an initial list of 46 sites and their respective Universal Resource Locators (URLs). This list is the quintessential sample of convenience, having been provided by colleagues. From this list, more sites were added by pursuing hypertext reference (HREF) links to similar products or services. Word-of-mouth recommendations from colleagues were a source of still more sites. The fifty-eight sites included in this study are, of course, not a representative sample of the World Wide Web site population at large. No sample can exist until a sample frame listing of all sites is available.

Each site was visited to answer six questions. If documentation could not be found at the site itself to answer these questions, contact was attempted by e-mail, or by telephone in accordance with communication instructions posted at the site. No sites were encountered where the questions could not be answered. During the six-month study, four sites could no longer be located. These sites were coded as "extinct."

The five questions asked dealt with the following topics:

1. **Type of Product/Service Offered.** What type of product or service is the site electronically marketing or providing on the Web?
2. **Organizational Category.** What affiliation does the site have?

3. **Structure of Charges.** How are users charged, if they are charged at all, for the products or services offered by an organization?
4. **Revenue Base.** If the site offers valuable information at a zero price, how does the site derive its fiscal nourishment.
5. **Motive for Existence.** Why has the site been constructed and maintained?

1. The type of product or service was initially recorded as an open-ended item in order to accommodate more than fifty uniquely classified descriptions. Later, a panel of three Web surfers was employed to reduce the number of product types to the eighteen product codes and descriptions listed below.

Art	Electronic fine art galleries
Books	Electronic book stores
Businfo	Business info provided on the Web
Consult	Consulting services advertised or provided electronically
Encyc	Electronic encyclopedia
Info	General information provided on the Web
Infobusn	Investing information provided on the Web
Infogovt	Government information provided on the Web
Jobhunt	Employment information provided on the Web
Movies	Movie database information provided on the Web
Mtnbike	Mountain biking information provided on the Web
Netaddr	Electronic address information provided on the Web

Pageart	Web page art and textures provided on the Web
Phone	Electronic phone book
Publ	Publishing electronic periodicals
Search	Web search engines
Software	Electronic software store
Travel	Travel information provided on the Web
Weather	Current and forecasted weather information provided on the Web

2. Determining the Organizational Category was largely, though not entirely, a matter of coding sites by domain category. (A domain is a subset of the Web at large; for example, the domain for educational institutions is .edu in the United States and is .ac in Europe). Organizational category was included to highlight notable exceptions to coding by domain category only, in accordance with a decision to sort according to the behavior, instead of the occupation, of those managing Web sites.

Corporate	Companies using .com, and .net domain names.
Academic	Educational institutions using .edu and .ac domain names.
Government	Federal agencies using .mil, .org, or .gov domain names.
Individual	Non-commercial private use of .net or .edu domain names.
Extinct	Site no longer at the URL address (Error code 404 or No DNS ENTRY), with no Forwarding information presented.

3. The structure of charges was defined as:

- **Free.** No charge at all to users nor any conditions of usage for the site.
- **Temporarily free.** Free trial usage of the entire capability of the site for a limited time.
- **Free with registration.** Online "user profile" registration required prior to access information. E-mail is most often used to communicate a request for access to the site. The registration is complete when the request is processed and a password or access code is returned via E-mail.
- **Charge.** Some type of direct cost to users for a specified use of goods and services described as a per-use or per-time period standard charge.
- **Tiered Charge.** Upgraded levels of access available for a fee.

It should be noted that often a mix of charging criteria was used by a site. For example, a temporarily free usage period was sometimes followed by a tiered charging scheme. In these instances, the higher complexity charging criteria were recorded for the site. This complexity of charging criteria is a common sense approach to describe the charging hierarchy. For example, going from a free scheme to any charge scheme involves an increase in the charging complexity; similarly a transition from a straight charge to a tiered charge scheme would also involve an increased level of complexity.

4. Revenue base:
  - **Open advertising to users.** Sale of Web page space to paying advertisers.
  - **Self advertising to users.** Self promotion in the electronic format.
  - **Self financed.** Includes governmentally funded sites.
  - **Sponsorship.** Third-party investment of time, technology or money for a future return on their investment.
  - **University.** Advanced learning institutions often fund Web site design and support by faculty and lab technicians.
  - **Fees to users.** Users pay per use or per specified time period for access to information.
  - **Sale of product to users.** Electronic shopping mall: pay by credit card by either using a secure Internet protocol or phoning the company with the required information.
  - **Segmented fees.** Free or reduced cost to private or educational users, with full cost to businesses.
5. The motive for existence of a site fell into one of the following:
  - **Profit.** To net more from a combination of charges and base revenue received than the cost incurred to provide the informational service offered.



- **Self advertising.** Companies, especially high-tech ones, often wish to achieve name recognition through Web exposure.
- **Academe.** An institutional requirement for faculty and students to have access to and a presence on the Web.
- **Altruism.** Web site was set up and maintained without monetary compensation for time and effort spent.
- **Unclear.** Motive for existence could not be determined.

In order to generate descriptive and inferential statistics using the SPSS application, the researcher used the database topic questions to create eight variables:

- variable 1 Case ID#
- variable 2 Category
- variable 3 Charge
- variable 4 Documentation
- variable 5 Motive
- variable 6 Revenue base
- variable 7 Product
- variable 8 Case ID name

The Web site data for each variable was alphabetically coded in order to run SPSS, and produce histogram representations of frequency and percentage of occurrence for each variable. Following these descriptive statistics, the strength of association between pair-wise comparisons of the nominal variables was tested. Due to the varying column x row configurations of the cross tabulations, Cramer's V was

selected as the appropriate test of the correlation (Emory and Cooper, 1995). The results of the fifteen separate Cramer's V tests showed the relative strength and statistical significance of each association.

The findings chapter contains the results of the testing.



### III. FINDINGS

#### A. DESCRIPTION

The fifty-eight sites included in this study are listed in the Appendix.

The distribution of sites by product or service was:

	Frequency
ART	2
BOOKS	2
BUSINFO	2
CONSULT	2
ENCYC	1
INFO	4
INFOBUSN	5
INFOGOVT	4
JOBHUNT	1
MOVIES	1
MTNBIKE	2
METADDR	7
PAGEART	4
PHONE	8
PUBL	1
SEARCH	8
SOFTWARE	2
TRAVEL	1
WEATHER	1
Total	58

Measured according to product or service, the most frequently occurring sites were electronic phone books and Web search engines, each accounting for 13.8% of the sites surveyed. Next most frequent was Internet address information services, accounting for 12.1% of the sites surveyed. Rounding out the top four was Infobusn at 8.6%. These top four categories, of the 19 different types of product and service listed above, accounted for 48.3% of the fifty-eight sites included in this study.

The distribution of sites by category was:

	Frequency
A Corporate	41
B Academic	5
C Government	5
D Individual	3
E Extinct	4
Total	58

Forty-one of the fifty-eight sites included in this study were corporate. Five of the sites were academic and five were government sites. Three sites were individual, and four were extinct.

The distribution of sites by documentation was:

	Frequency
A At the Web site	54
B Through e-mail or phone	4
Total	58

Of the fifty-eight sites included in this study, fifty-four provided documentation at the Web site to answer the questions. Because four Web sites in the study failed to provide adequate documentation, the questions were answered through contact by e-mail or phone.

The distribution of sites by charge structure was:

	Frequency
A Free	41
B Tempfree	3
C Registration, then free	1
D Charge	5
E Tiered charge	8
Total	58

Forty-one of the fifty-eight sites included in this study provided information at a cost of zero to users. Three sites provided information at a cost of zero to users but for a limited time period. One site was free, but required registration prior to use. Five sites charges users directly. Eight sites incorporated a tiered charging scheme.

The distribution of sites by revenue base was:

	Frequency
A Open Advertisement	24
B Own Advertisement	4
C University	4
D Self Financed	8

E Sponsor	3
F Fees from Users	4
G Segmented Fees	5
H Sale of Product to Users	6
Total	58

Of the fifty-eight sites included in this study, twenty-four used open advertisement to build revenue. Four sites advertised their own company's products or services. Four of the sites were university funded. Eight of the sites were self funded, which included government funded sites. Three of the sites existed through sponsorship revenue. Four of the sites built revenue from fees from users. Five of the sites created revenue through segmented fees to users by elasticity of demand. Six of the sites developed revenue through the sale of products or services.

Indications of motive were most often seen at the site. A site containing open advertising, self advertising, sale of products, or directly charging users was seen as motivated by profits. Similarly a site with no charging scheme, or advertisement was seen as altruistic.

The distribution of sites by motive was:

	Frequency
A Profit	38
B Firm Advertising	10
C Altruism	3
D Academe	5
E Unclear	2
Total	58

Sixty-five percent of the sites included in this study existed to make a profit through paid advertisement.. Seventeen percent held their own advertisement on the Web as their primary motivation for existence. Five percent of the sites studied existed due to altruistic motivation. Eight percent existed to satisfy an academic motivation. Finally there were two sites that had unclear motivation for existence.

## **B. ANALYSIS**

A framework was created to test the strength of the relationship between pairwise comparisons of the nominal variables. Chi squared testing for relationships between nominal variables is limited to tables with dimensions of two by two. Cramer's V is a modification of Chi squared for tables larger than 2 x 2. (Blalock, 1979) Due to the varying column configurations of the cross tabulations required, Cramer's V (pronounced "vee") was selected as the appropriate test of the correlation of fit (Emory and Cooper, 1995). A result with a Cramer's V coefficient of zero indicates no relationship between the variables exist; correspondingly a coefficient of one indicates a complete dependency (Perfect correlation) between the variables. The range between these two extremes, from zero to one, depicts the relative strength of each relationship. The closer to one the results were, the stronger the relationship or dependency between the variables, the closer to zero the weaker, or more likely to occur simply by chance. Since the data are nominal level there is no concept of an inverse relationship. The results of the fifteen separate Cramer's V tests showed the relative strength and significance of each association. The testing provided for one of two outcomes; either reject or fail to reject the null hypothesis that there is no relationship between the variables. The results are described below.



#### Category by Charge

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Category and Charge.

#### Category by Documentation

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Category and Documentation.

#### Category by Motive

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .743. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Motive.

#### Category by Revenue

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

Cramer's V gives us a coefficient of .629. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Revenue.

#### Category by Product

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .705. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Product.

#### Charge by Documentation

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Charge and Documentation.

#### Charge by Motive

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Charge and Motive.

#### Charge by Revenue

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .457. Therefore, the researcher rejected the null hypothesis that there is no relationship between Charge and Revenue.

#### Charge by Product

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Charge and Product.

#### Documentation by Motive

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. We failed to reject the null hypothesis that there is no relationship between Documentation and Motive.

#### Documentation by Revenue

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Documentation and Revenue.

#### Documentation by Product

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

No pattern of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Documentation and Product.

#### Motive by Revenue

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .661. Therefore, the researcher rejected the null hypothesis that there is no relationship between Motive and Revenue.

#### Motive by Product

- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .736. Therefore, the researcher rejected the null hypothesis that there is no relationship between Motive and Product.

#### Revenue by Product

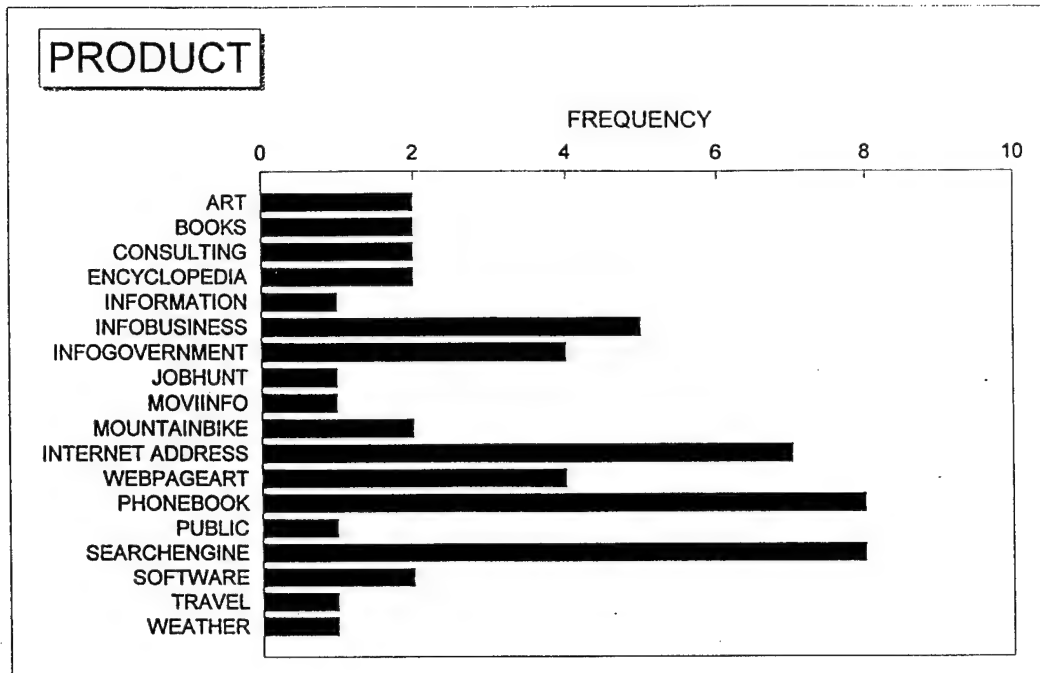
- Ho: Cramer's V is equal to zero.
- Ha: Cramer's V is not equal to zero.

The results of the statistics provided a Cramer's V coefficient of .672. Therefore, the researcher rejected the null hypothesis that there is no relationship between Revenue and Product.

The inferences that can be drawn from the results of these tests are addressed in the next chapter.

The initial concern that motivated this study was the sustainability of Web sites that provide valuable information at a cost to the user of zero. This created a skeptical "How is this going to work?" reaction. Upon examination, "how it works" is self explanatory.

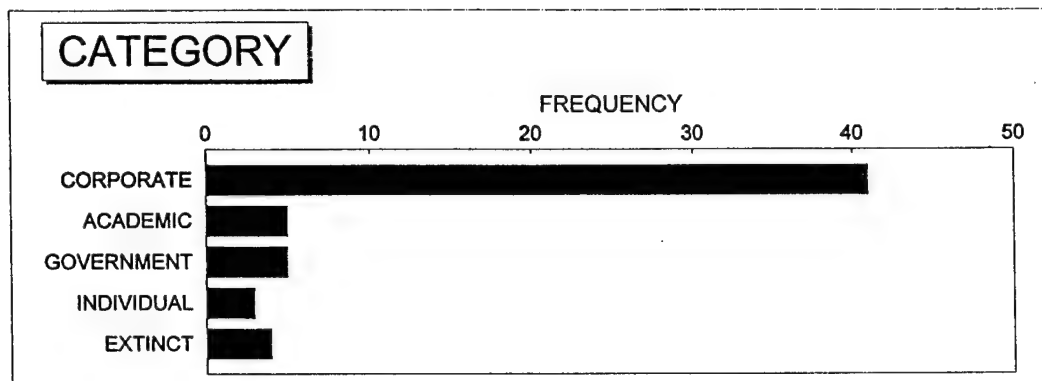
The researcher first looked at the distribution of sites by product.



The product or service descriptive showed the highest frequency of the sites included in this study to be electronic phone books and Web search engines each accounting for eight of the fifty-eight sites surveyed. Next in order of frequency of occurrence were Internet address information services, accounting for seven of the sites surveyed. Rounding out the top four most frequently occurring products or services in this study was business information with five sites. These top four categories of the 19 different types of product and service listed above, accounted for 48.3% of the fifty eight sites included in this study.

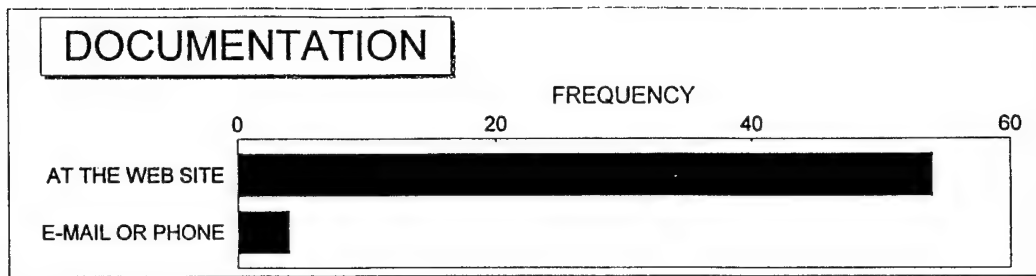
These results agree with a view of the Web as an information source. Finding the proverbial needle in the haystack (Internet World, 1996) is becoming more

difficult as the number of Web sites continues to grow. It follows that a majority of sites would be involved with aiding the user to locate required information. This aid manifests itself most frequently as a corporate-based search engine. This corporate Web site frequency is clearly displayed in the next descriptive, the distribution of sites by category.



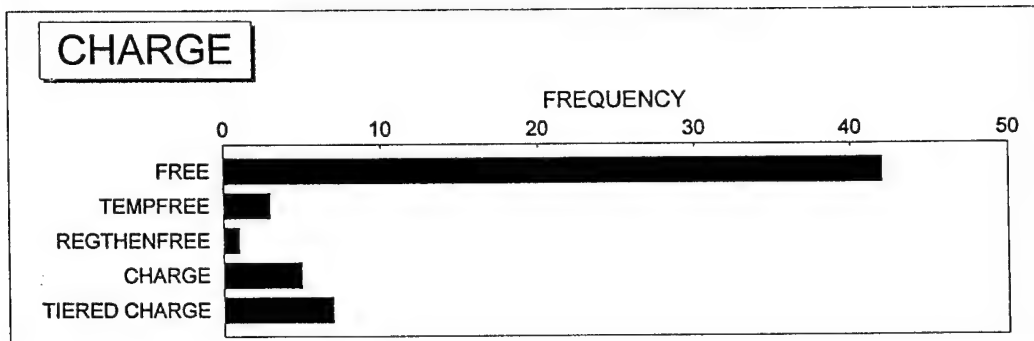
Forty-one of the fifty-eight sites included in this study were corporate. Five were Academic sites and five were Government sites. Three sites were individual, and four were extinct. The data also showed an inconsistency between URL and category. A site with a .edu extension was supported entirely by a professor without the support of the university. This inconsistency highlighted the requirement to sort by category of site in addition to URL domain. We categorized this site as individual in accordance with a decision to sort on behavior versus occupation.

Web sites provide information readily and openly to users. This is well demonstrated by the distribution of sites that made documentation available to answer our research questions through the Web site itself.



Of the fifty-eight sites included in this study, fifty-four provided documentation at the Web site to answer our questions. Only four Web sites in the study failed to provide adequate documentation at the site, but our questions were answered through contact by e-mail or phone.

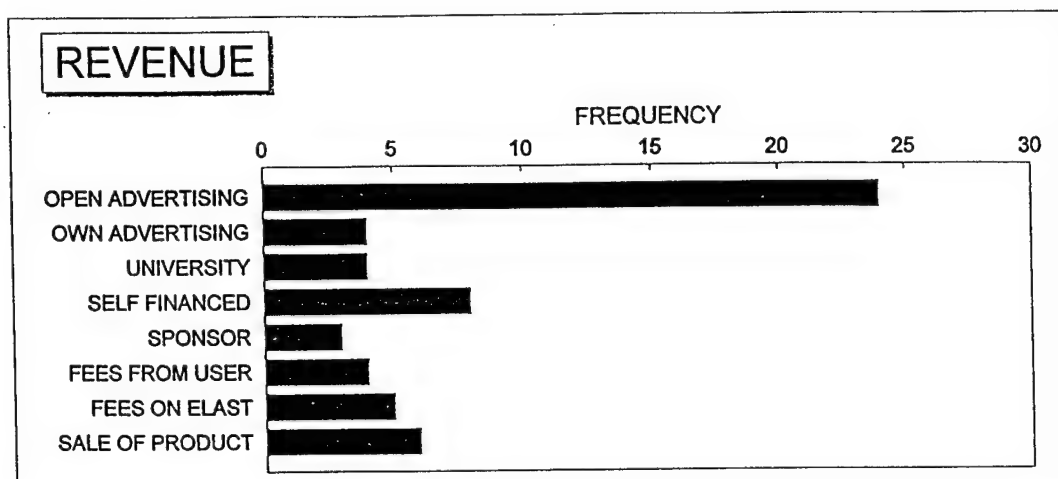
The distribution of sites by charge structure was:



Forty-one of the fifty-eight sites included in this study provided information at a price of zero to users. This is consistent with the original question that motivated the study, "How can sites be providing valuable information, at a cost of zero to users?" Three sites provided information at a cost of zero to users but for a limited time period. One site was free, but required registration prior to use. Only five sites

charged users directly. Market segmentation is taking place on the Web, as eight of the fifty-eight sites in this study incorporated a tiered charging scheme.

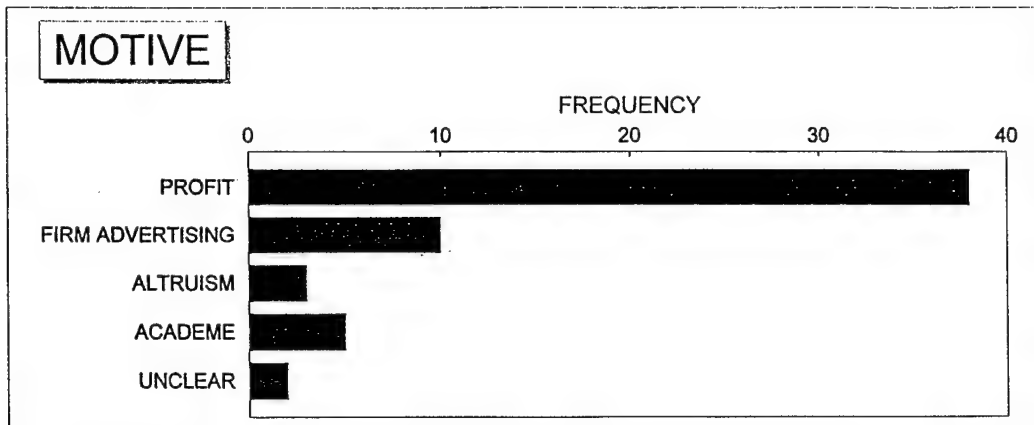
The distribution of sites by revenue base was:



Of the fifty-eight sites included in this study, twenty-four used open advertisement to build revenue. Four sites advertised their own company's products or services. Four for the sites were university funded. Eight of the sites were self funded, which also included sites funded by governmental agencies. Three of the sites existed through sponsorship revenue. Only four of the sites earned revenue from fees from users. Five of the sites created revenue through segmented fees to users by elasticity of demand. Six of the sites developed revenue through the sale of products or services. These results were in agreement with our initial reaction that very few sites, nine of the fifty eight, charged users.



The distribution of sites by motive was:



The forty-eight sites motivated by profit or self advertising reflects consistency with the large number of corporations funding Web page design and maintenance. The five academic sites represented gave us no surprise. The three altruistic sites fall under the hackers ethic or hobby mentality.

#### IV. DISCUSSION

The fifteen separate Cramer's V tests showed the relative strength and significance of each variable-to-variable association. These results provided further insight in to the rationale behind providing valuable information at a cost of zero to the user.

##### **Category by Charge**

No pattern of association that would be other than chance was revealed. This was counter intuitive. However, the researcher failed to reject the null hypothesis that there is no relationship between Category and Charge. This is due in large part to the majority of sites that do not charge users regardless of the sites category.

##### **Category by Documentation**

With all but four of the fifty-eight sites surveyed providing documentation at the Web site, it was no surprise that no strength of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Category and Documentation.

##### **Category by Motive**

Our initial belief in a strong correlation between category of a site and it's motive for existence was on target, evidenced by a Cramer's V coefficient of .743 between the variables. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Motive.

##### **Category by Revenue**

The results of the statistics show a Cramer's V coefficient of .629, forecast as a strong relationship, this was no surprise. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Revenue.

### **Category by Product**

The researcher had projected a strong relationship between the type of product and the category of the Web site and in fact produced a Cramer's V coefficient of .705. Therefore, the researcher rejected the null hypothesis that there is no relationship between Category and Product.

### **Charge by Documentation**

Again all but four of the fifty-eight sites surveyed providing documentation at the Web site, it was no surprise that no strength of association that would be other than chance was revealed. The research failed to reject the null hypothesis that there is no relationship between Charge and Documentation.

### **Charge by Motive**

In contrast with what the researcher had expected, no pattern of association that would be other than chance was revealed between Charge and Motive. After analysis the researcher concluded that this is due in large part to the majority of sites that do not charge users regardless of the sites category, and therefore, the researcher failed to reject the null hypothesis that there is no relationship between Charge and Motive.

### **Charge by Revenue**

The researcher fully expected a strong correlation between the charging scheme of a site and its revenue base. In agreement with these expectations, the results of the statistics provided a Cramer's V coefficient of .457. Therefore, the researcher rejected the null hypothesis that there is no relationship between Charge and Revenue.

### **Charge by Product**

No pattern of association that would be other than chance was revealed. Again, the researcher believes this is due in large part to the majority of sites that do

not charge users regardless of the category of the site. The researcher failed to reject the null hypothesis that there is no relationship between Charge and Product.

#### **Documentation by Motive**

With all but four of the fifty-eight sites surveyed providing documentation at the Web site, it was no surprise that no strength of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Documentation and Motive.

#### **Documentation by Revenue**

With all but four of the fifty-eight sites surveyed providing documentation at the Web site, it was no surprise that no strength of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Documentation and Revenue.

#### **Documentation by Product**

With all but four of the fifty-eight sites surveyed providing documentation at the Web site, it was no surprise that no strength of association that would be other than chance was revealed. The researcher failed to reject the null hypothesis that there is no relationship between Documentation and Product.

#### **Motive by Revenue**

The Cramer's V coefficient of .661 was indicative of what the researcher expected. A sites motive for existence is in fact closely related to the revenue base it builds. Therefore, the researcher rejected the null hypothesis that there is no relationship between Motive and Revenue.

#### **Motive by Product**

Here motive by product provided a highly correlated Cramer's V coefficient of .736. Common sense dictates that there be a strong relationship between a Web sites motive for existence and the type of product or service it provides. Therefore,

the researcher rejected the null hypothesis that there is no relationship between Motive and Product.

### **Revenue by Product**

With a Cramer's V coefficient of .672 the results of the statistical analysis show a strong relationship between revenue and product. These results are consistent with earlier expectations of a strong relationship. Therefore, the researcher rejected the null hypothesis that there is no relationship between Revenue and Product.

## V. CONCLUSION

In addressing our original question "How could these sites keep going if they were giving away the goods?", the researcher found there were actually very few "free lunches" on the Web. We pay with our taxes, or exposure to corporate marketing plans, for what we receive.

**Profit.** Financial gain is a strong motive through advertising and tiered charging schemes, and companies effectively building revenue. This is aided by a growing user population.

**Government Success.** Though the original impetus may have been simply because everybody else was doing it, the government agencies that have set up Web sites have found a relatively cheap and effective method of information distribution.

**Academic Success.** The Web has always been, and will continue to be embraced by universities. They have resources of both graduate students, and faculty to ensure their mission.

**Altruism success.** This is perhaps the most difficult to grasp, because the altruistic motive must remain for the site to remain. Yet the result is that the Web has possessed the "Hacker's ethic" since its birth. We have found no evidence of mortality among Web sites founded in altruism.

The future of almost all the Web sites studied in this research looks bright indeed. They are not going to go away because of all the above mentioned reasons for longevity. This is comforting news to DOD users of informational services found on the Web. Their dependency is both reasonable and appropriate. The research has shown they are not likely to lose access to these services in the foreseeable future.



## **APPENDIX. CODED DATABASE OF SITES INCLUDED IN STUDY**



FIRM	URL	PRODUCT/SERVICE	1	2	3	4	5
Aldea	www.aldea.com	White and yellow pages	A	E	G	A	A
Alta Vista	www.altavista.digital.com	Search engine	A	A	B	B	A
Backgrounds	weber.u.washington.edu/~pfloyd/backgrounds/	Web page textures	E	A	C	D	A
BizWeb	www.bizweb.com	Web directory	A	E	G	A	B
Books	melville.books.com/scripts/search1.exe	Book sales	A	A	H	A	A
Britanica OnLine	www.eb.com/	Online encyclopedia	A	B	F	A	A
Cnet	www.cnet.com	Information	A	C	A	A	A
ColorMaker	www.missouri.edu/c588349-bin/colormaker.cgi	Freeware	B	A	C	D	A
Digital Directory	www.dda-inc.inter.net	CD rom phone books	A	E	H	A	B
Directory USA	www.parsonstech.com	Directory information	A	A	A	A	A
Dirt Links	cyclery.com/dirt_rag/links.html	Mountain bike info	A	A	A	A	A
Dun&Bradstreet	www.dbisna.com	Stock market analysis	A	D	F	A	A
Economic resources	info.mcc.ac.uk/som_econ_G/econlinkgs.html	Economic information	E	A	A	A	A
Electric Library	www.elibrary.com	Information	A	B	G	A	A
Eurolink	www.syselog.com/eurolink/	Consulting	A	A	H	A	A
Excite	www.excite.com	Search engine	A	A	A	A	A
Federal Budget	http://ibert.org	Information	C	A	D	B	A
Find A Friend	www.ais.net/findafriend/	Search service	A	E	F	A	A
GearHead Cyberzine	www.gearhead.com/toc.html	Electronic Magazine	A	A	E	E	A
GPO text database	www.access.gpo.gov/su_docs/	Government information	C	E	F	A	A
HM government	www.open.gov.uk/	Information	C	A	D	A	A
Hoover Online (Time Inc.)	www.pathfinder.com/	Information network	A	E	F	A	A
Infoseek	guide.infoseek.com	Search engine	A	A	A	A	A
IntelliMatch	www.intellimatch.com	Job search	A	A	C	A	A
Internet Address Finder	www.iaf.net/	Address information	A	A	A	A	A
Investors Edge	www.imet.com/pages/login.stm	Information	A	E	A	A	A
Just Published Books	www.books.com/scripts/newbooks	Book sales	A	A	H	A	A
LFI Lost Friends	www.lost-and-found.com/lfc/locate.html	Information	A	A	A	A	A
Louvre	mistral.enst.fr/~pioch/louvre/louvre.html	Fine Art	A	A	A	A	A
Lycos	www.lycos.com	Search engine	A	A	A	A	A
Mac Internet applications	community.net/~csamir/macapp.html	Information	D	A	D	C	A
Mac Internet Helpers	www.tiac.net/users/mdw/imap/helpertxt.html	Information	D	A	D	C	A
Magellan	www.mckinley.com	Search engine	A	A	A	A	A
Marketplace Resources	www.mktplace.com	Information	A	D	H	A	B
MIT site for PGP	web.mit.edu/network/pgp.html	Information	B	A	C	D	A
Money & Investing	update2wsj.com/briefingbook/textsearch.html	Investment information	A	B	G	A	A
Movie database	www.msstate.edu/	Movie information	B	A	A	E	A
Net Locator	www.nln.com/	Web search engines	A	A	A	A	A
Netfind Search	www.nova.edu/Inter-Links/netfind.html	Link information	D	A	C	C	B

Open Text Index	www.opentext.com/omw/f-omw.htm.	Search open text	A	A	A	A
Page registration	www.ogi.com/world/	Information	A	A	A	A
People lists	rpi.edu/internet/guides/decmj/icmc/culture-people-lists.html	Information	E	A	A	A
Phone Search	www.delorme.com	Atlas information	A	D	G	A
Pixelsight	www.pixelsight.com	Web design services	A	D	H	A
Ridler	www.ridler.com	Information	A	A	A	A
Search.com	www.search.com/?netscape.seachbtn	Information	A	A	A	A
SEC	http://www.sec.gov/edgarhp.htm	Government	C	A	D	A
Shareware.com	www.shareware.com/?netscape.swbtn	Search Cnet	A	A	A	A
SignOn San Diego	www.uniontrib.com/	Electronic Newspaper	A	A	A	A
Switchboard	www.switchboard.com	Information	A	A	B	A
TechInvestor	techweb.cmp.com/investor/	Information	A	A	B	A
Texture Land	www.meat.com/textures/	Web page support	A	E	E	A
Travis AFB Home Page	www.travis.af.mil/	Flight information	C	A	D	A
UI weather	www.uiuc.edu/misc/weather.html	Weather information	B	A	C	A
Web Digest for Marketers	www.chaseonline.com	Consulting	A	D	B	A
WebMuseum:Bienvenue!	sunsite.unc.edu/wm/	Art appreciation	B	A	E	A
Who Where	www.whowhere.com/	Location information	A	A	A	A
Yahoo	www.yahoo.com	Search engine	A	A	A	A

## Variable codes

1. Category: A Corporate, B Academic, C Government, D Individual, E Extinct.
2. Charge: A Free, B Tempfree, C Registration required then free, D Charge, E Tiered charge.
3. Revenue: A Open Advertisement, B Own Advertisement, C University, D Self financed, E Sponsor, F Fees from users, G Fees based on elasticity of demand, H Sale of product to users.
4. Motive: A Profit, B Firm advertising, C Altruism, D Academe, E Unclear.
5. Documentation: A At the Web site, B Through e-mail or phone.



## LIST OF REFERENCES

- Andrews, Whit, "Content Providers See Dollar Signs," Web Week, April 29, 1996.
- Blalock, Hubert M., Jr., Social Statistics, 2nd Edition, McGraw Hill, p. 314, 1979.
- Breen, Christopher, "Internet Underground Music Archive", Web Techniques, May 1996.
- Cooper, Donald R., and William C. Emory, Business Research Methods, 5th Edition, Richard D. Irwin, Inc., 1995.
- Denzin, Norman K., The Research Act, 3rd Edition, Prentice Hall, 1989.
- Ellsworth, Jill H., "Advertising on the Internet," Americal Online Business Library C., 1996.
- Ellsworth, Jill H., and V. Matthew, "Why Do Business on the Internet?", America Online Business Library C., 1996.
- Fitzgerald, J., Business Data Communication, Basic Concepts, Security, and Design, John Wiley and Sons, Inc., 1993.
- Forbes ASAP, 26 February 1996.
- Forbes ASAP, 3 June 1996.
- Forbes ASAP, 26 August 1996.
- Gupta, A., Stahl and Whinston, "The Internet: Future Tragedy of the Commons," University of Texas at Austin, July 6-7, 1995.
- Haga, William J., Interview, June 1996.
- Kabacoff, Robert A., Interview via e-mail kabacoff@cps.acast.nova.edu.
- Krol, E., The Whole Internet, O'Reilly & Associates, Inc., 1992.

Levine, Joshua, "Marketing the Internet", Forbes, 9 September 1996.

McCabe, Kathryn, "Who Runs the Net?", Online Access, p. 51, February 1996.

Nagle, T., The Strategy and Tactics of Pricing, Prentice Hall, 1987.

Resnick, Rosalind, "Follow the Money", Internet World, May 1996.

## INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center ..... 2  
8725 John J. Kingman Road, STE 0944  
Fort Belvoir, VA 22060-6218
2. Dudley Knox Library ..... 2  
Naval Postgraduate School  
411 Dyer Road  
Monterey, CA 93943-5101
3. Prof. William J. Haga (Code SM/Hg) ..... 5  
Naval Postgraduate School  
411 Dyer Road  
Monterey, CA 93943-5103
4. Prof. David R. Henderson (Code SM/Ht) ..... 5  
Naval Postgraduate School  
411 Dyer Road  
Monterey, CA 93943-5103
5. Charles A. Romano ..... 2  
3033 Cottonwood View Dr.  
El Cajon, CA 92019